

DISCUSSION OF THE AMENDMENTS

Claim 1 and 18 are currently amended.

Claims 2 -17 were previously presented.

Upon entry of the amendments claims 1-18 will be active.

Claims 1 and 18 were amended to clarify claim language and the amendments do not limit the scope of the claims as previously presented.

No new matter has been added.

REMARKS

The Office rejected claims 1-18 under 35 U.S.C. §103(a) over the combination of Herman et al. (U.S. Patent No. 4,361,712), Zhang et al. (U.S. Patent No. 5,948,944) and Sawicki (U.S. Patent No. 6,506,948). Applicants submit that the combination of the cited references do not teach or suggest all the recitations of the claimed process; and therefore, the claimed process would not have been rendered unpatentable over the cited references. Specifically, the cited references do not teach or suggest acidifying the alkaline wastewater of mononitrotoluene preparation to a pH of at most 3 and treating the nitrocresols formed with an extractant and then utilizing the extracted nitrocresols as a feedstock in the preparation of dinitrotoluene (DNT).

The disclosed process involves the preparation of DNT by nitration. As Applicants note on page 1 of the specification the production of mononitrotoluene (MNT) yields, as a by-product, nitrocresols. The nitrocresols are typically removed from the (MNT) product by washing with an alkaline solution to form the corresponding water soluble nitrocreolate salt.

The organic (MNT) solution is then separated from the aqueous nitrocreolate solution by phase separation. The alkaline solution is then sent to wastewater treatment. As Applicants note, the nitrocresols in the wastewater are difficult to biodegrade so that an alternate process for eliminating the nitrocresol by-product is desirable. Applicants have found that the addition of the nitrocresol by-product as a feedstock to a process for preparing dinitrotoluene does not adversely affect the formation of unwanted nitrocresol by-product in the preparation of the dinitrotoluene. This result is illustrated in Examples 4 and 5 of the specification. The claimed process provides for a method of removing unwanted nitrocresol product without having to use wastewater biodegradation techniques.

Herman describes a method of reducing cyanide in a nitroaromatic process. Herman describes the use of alkaline washing to remove nitrocresols from the process. However, as the Office notes on page 4 of the Office Action Herman does not teach or suggest acidifying the alkaline wastewater of MNT preparation to a pH of at most 3 and treating the nitrocresols with an extractant.

Zhang describes a two-stage DNT production process. The Office notes that in column 3 lines 5-12 Zhang describes adding all or part of the aqueous phase back to the toluene reaction step. However, this aqueous phase does not contain cresols as described in column 1, lines 32-38.

Applicants note that the cresols will remain in the organic phase as long as the aqueous phase remains acidic as it does in the process described in Zhang. In Zhang, there is no alkaline washing in this step and alkaline washing is required to move the cresols from the organic phase to the aqueous phase. Therefore, there is no cresol added back to the toluene reacting step as the Office has suggested. Accordingly, Zhang does not teach or suggest utilizing an extracted nitrocresol as a feedstock in the preparation of dinitrotoluene.

Sawicki describes a process for the production of DNT. The process involves generating both “weak acid wastewater” and “alkaline wash water” (column 2, lines 4-31). The process in step (c) extracts MNT, DNT and organic by-products from the alkaline wash water stream by contacting the stream with an organic phase generating an organic layer and an extracted alkaline wash water fraction.

Applicants note that the extracted alkaline wash water fraction (139) in column 4, lines 58-62 of Sawicki is discharged for subsequent treatment (i.e., wastewater treatment). Applicants note that this discharged alkaline fraction contains the water soluble cresolate salt. This cresolate salt is being sent to wastewater treatment and it is this salt Applicants seek to eliminate from wastewater treatment facilities. (As noted above.)

Applicants would like to emphasize that the alkaline water is being acidified in the claimed process to neutralize the cresolate salt so that it can be extracted back into an organic phase and it is this extractant that is being used as the feedstock in the claimed process. Accordingly, Sawicki does not teach or suggest all the recitations of the claimed method because Sawicki is discharging the cresolate aqueous phase to wastewater and not utilizing the nitrocresol as a feedstock.

Applicants also note that one skilled in the art would try to keep contaminants such as nitrogresols in the feed as low as possible (i.e., not add nitrocresols). As noted on page 1, lines 20 to 25 of the specification such contaminants negatively impact nitrotoluene product quality.

Accordingly, those skilled in the art would not add nitrocresols as a feed-stock since conventional wisdom is that nitrocresols are undesirable. In other words, conventional wisdom teaches away from the claimed process.

Furthermore, a person skilled in the art knows that in the hydrogenation of DNT to toluenediamine (TDA), both nitrophenol and nitrocresol are strong catalyst poisons and decomposition activators (see Ullmann's Encyclopedia of Industrial Chemistry, Chapter "Amines, Aromatic, page 11, last sentence of the first paragraph). Since the most important utilization of DNT is its hydrogenation to TDA, which is an important intermediate for toluenediisocyanate (TDI) used in polyurethane production, a person skilled in the art would be deterred from increasing the nitrocresol concentration in the toluene-feed in DNT-production in view of the negative impact that nitrocresols have on subsequent work-up and reaction stages.

Overall, the combination of the cited references does not teach or suggest all the recitations of the claimed method as discussed above. Therefore, the claimed method would not have been obvious over the cited references, and accordingly, Applicants respectfully request that the Office withdraw the rejection of claims 1-18 under 35 U.S.C. §103(a) over the combination of Herman, Zhang and Sawicki.

Finally, Applicants note that claim 1 has been amended such that claim 1 is free of the criticisms outlined on page 2 of the Office Action. Accordingly, the rejection under 35 U.S.C. §112, second paragraph should be withdrawn.

In view of the above remarks, applicant believes the pending application is in condition for allowance. Favorable reconsideration is respectfully requested.

Applicant believes no fee is due with this response. However, if a fee is due, please charge our Deposit Account No. 03-2775, under Order No. 12810-00229-US1 from which the undersigned is authorized to draw.

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Respectfully submitted,
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